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Fig. 1

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Fig. 2

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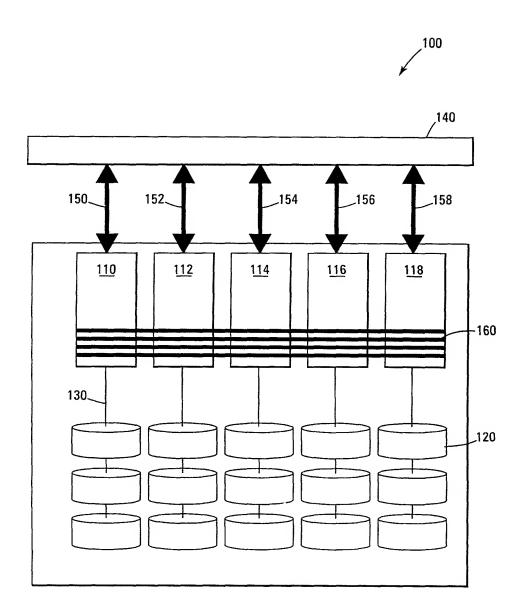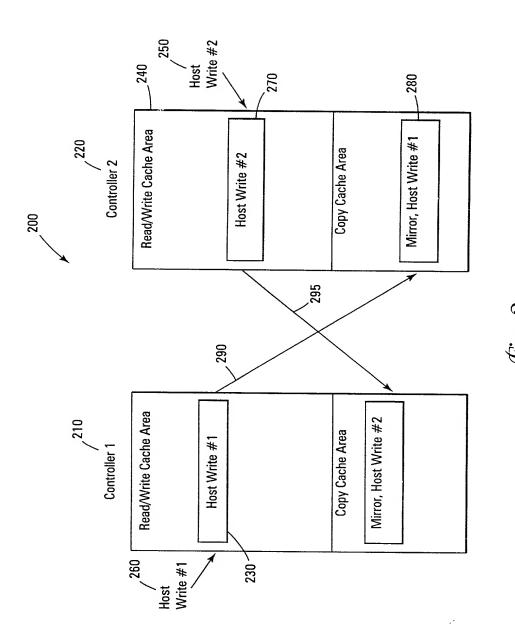Atty dkt. SJO920010114US1 / 501.405US01

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300

```
            ┌──────────────────────────────┐
            │ Partition cache for each      │──305
            │ controller into two segments: │
            │ Read/Write and Copy           │
            └──────────────────────────────┘
                          │
                          ▼
            ┌──────────────────────────────┐
            │ The first controller          │──310
            │ receives Host Write #1        │
            └──────────────────────────────┘
                          │
                          ▼
                        ╱────╲   320
                      ╱        ╲
                    ╱  Does any  ╲
                  ╱  data that     ╲              330
                 │ overlaps a write │  Yes  ┌──────────────────────────┐
                 │ to the first      │─────▶│ Flush overlapping data    │
                  ╲ controller exist ╱       │ that exists on the        │
                    ╲ on the second ╱        │ second controller         │
                      ╲ controller?╱         └──────────────────────────┘
                        ╲────╱                          │
                     No  │                              │
                         ▼                              │
            ┌──────────────────────────────┐◀───────────┘
            │ The first controller          │──340
            │ accepts data from the host    │
            └──────────────────────────────┘
                          │
                          ▼
   350──┌──────────────────────────────┐
        │ Determine where to mirror data│
        │ on the second controller      │
        └──────────────────────────────┘
                          │
                          ▼
        ┌──────────────────────────────┐
        │ Mirror data from the first     │──360
        │ controller to the second       │
        │ controller                     │
        └──────────────────────────────┘
                          │
                          ▼
   370──┌──────────────────────────────┐
        │ The first controller provides  │
        │ status to the host             │
        └──────────────────────────────┘
```
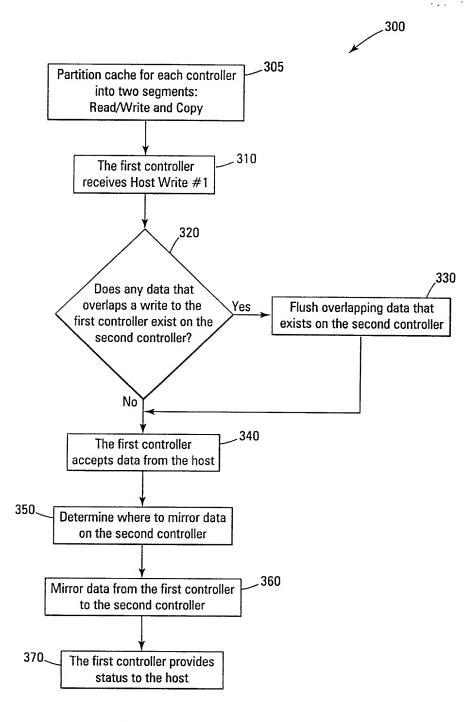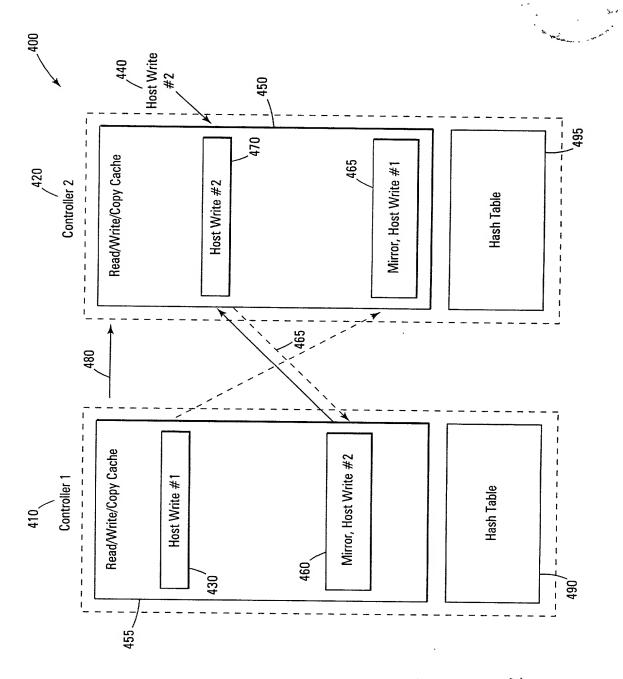
Fig. 3

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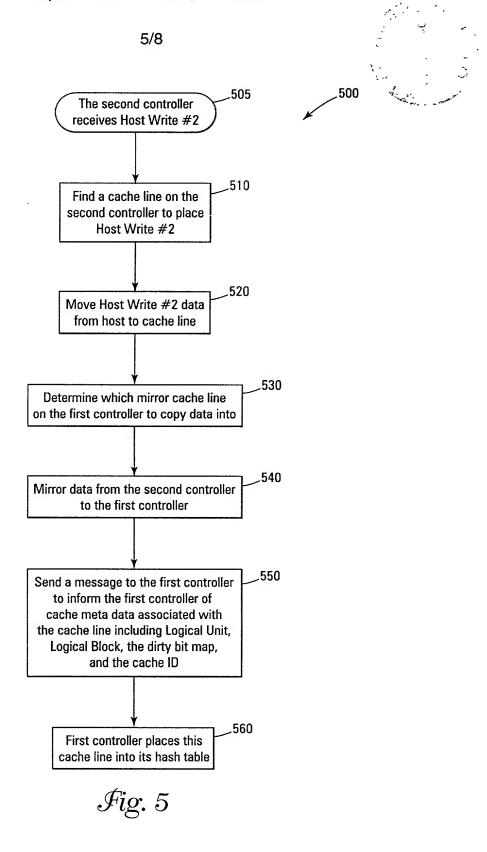METHOD AND APPARATUS FOR MAINTAINING CACHE COHERENCY IN A STORAGE SYSTEM
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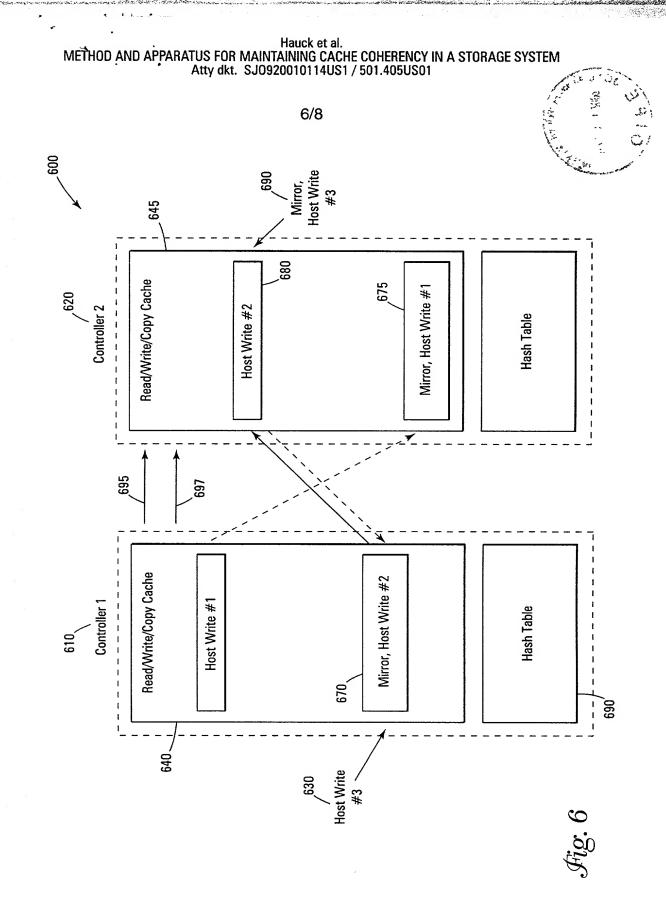Fig. 4

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```
                  ┌──────────────────────┐ ___505
                  │  The second controller│
                  │  receives Host Write #2│
                  └──────────┬───────────┘
                             │
                             ▼
                  ┌──────────────────────┐ ___510
                  │  Find a cache line on the│
                  │  second controller to place│
                  │  Host Write #2       │
                  └──────────┬───────────┘
                             │
                             ▼
                  ┌──────────────────────┐ ___520
                  │  Move Host Write #2 data│
                  │  from host to cache line│
                  └──────────┬───────────┘
                             │
                             ▼
                  ┌──────────────────────┐ ___530
                  │  Determine which mirror cache line│
                  │  on the first controller to copy data into│
                  └──────────┬───────────┘
                             │
                             ▼
                  ┌──────────────────────┐ ___540
                  │  Mirror data from the second controller│
                  │  to the first controller│
                  └──────────┬───────────┘
                             │
                             ▼
                  ┌──────────────────────┐ ___550
                  │  Send a message to the first controller│
                  │  to inform the first controller of│
                  │  cache meta data associated with│
                  │  the cache line including Logical Unit,│
                  │  Logical Block, the dirty bit map,│
                  │  and the cache ID │
                  └──────────┬───────────┘
                             │
                             ▼
                  ┌──────────────────────┐ ___560
                  │  First controller places this│
                  │  cache line into its hash table│
                  └──────────────────────┘
```

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Fig. 6

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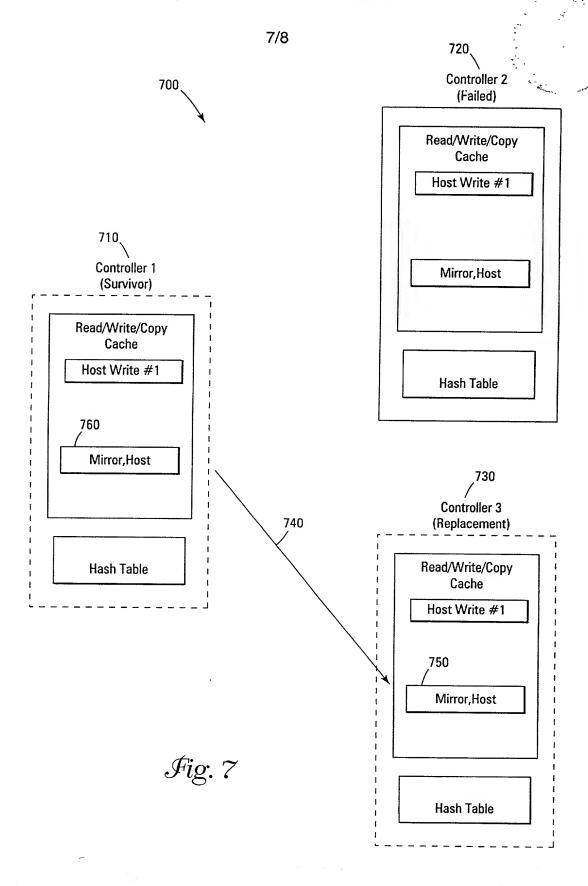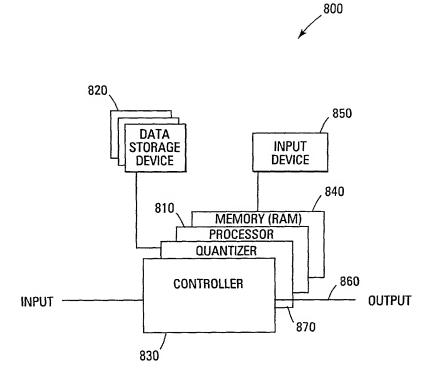Atty dkt. SJO920010114US1 / 501.405US01

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700

720

Controller 2
(Failed)

Read/Write/Copy Cache

Host Write #1

Mirror,Host

Hash Table

710

Controller 1
(Survivor)

Read/Write/Copy Cache

Host Write #1

760

Mirror,Host

Hash Table

740

730

Controller 3
(Replacement)

Read/Write/Copy Cache

Host Write #1

750

Mirror,Host

Hash Table

Fig. 7

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Fig. 8